

REMARKS

By the present amendment and response, claims 33, 45, 51, and 69 have been amended to overcome the Examiner's objections and claims 62-68 have been canceled. Thus, Claims 33-61 and 69-72 remain pending in the present application.

Reconsideration and allowance of pending claims 33-61 and 69-72 in view of the following remarks are requested.

The Examiner has rejected claims 33-39, 44, 45, 46-48, 51-57, 62-66, and 69-70 under 35 USC 102(e) as being anticipated by U.S. patent number 6,365,970 B1 to Tsai et al. ("Tsai"). The Examiner has further rejected claims 40-43, 49, 50, 58-61, 67-68, and 71-72 under 35 USC 103(a) as being unpatentable over Tsai. For the reasons discussed below, Applicant respectfully submits that the present invention, as defined by amended independent claims 33, 45, 51, and 69, is patentably distinguishable over Tsai. However, Applicant reserves the right to provide declarations and/or documents under 37 CFR 1.131 to "swear behind" the effective filing date of Tsai.

Subject to Applicant's reserved right to establish priority of the present invention under 37 CFR 1.131, Applicant submits that the present invention, as defined by amended independent claim 33 teaches, among other things, "at least one of said plurality of segments of said first interconnect metal extending along at least one side of said first metal pad structure," and a first via pad structure comprising a plurality of segments of a first via metal and a first plurality of dielectric fillers, "each of said first plurality of dielectric fillers being situated between two of said plurality of segments of said first via

metal, at least one of said plurality of segments of said first via metal being in contact with said at least one of said plurality of segments of said first interconnect metal.” As disclosed in the present application, the present invention provides an improved bonding pad, which is achieved by a novel support structure that provides increased mechanical support below the entire area of the bonding pad. As a part of achieving increased mechanical support to the bonding pad, the present invention provides a via pad structure comprising a number of via metal segments, where each of the via metal segments provides a column of solid metal support below the bonding pad.

As part of achieving the invention’s improved support structure, the present invention further provides a number of dielectric fillers to the via pad structure, which prevent “dishing” in the via pad structure. As a result, the via pad structure achieves an even profile, which is beneficial to the processing of subsequent layers in the IC chip.

Additionally, the present invention provides a via pad structure that includes a number of via metal segments that can be advantageously connected together to form a metal seal, which encloses a number of dielectric filler segments. As a result of the metal seal so formed, cracks that may develop in the dielectric filler segments are prevented from propagating to semiconductor circuits and devices located outside the metal seal.

In contrast, Tsai does not teach, disclose, or suggest “at least one of said plurality of segments of said first interconnect metal extending along at least one side of said first metal pad structure,” and a first via pad structure comprising a plurality of segments of a first via metal and a first plurality of dielectric fillers, “each of said first plurality of

dielectric fillers being situated between two of said plurality of segments of said first via metal, at least one of said plurality of segments of said first via metal being in contact with said at least one of said plurality of segments of said first interconnect metal.” Tsai specifically discloses bond pad structure 4, which includes at least one sub-structure combination layer 42 formed between two corresponding metal layers 41. See, for example, column 4, lines 41-45 and Figure 4B of Tsai. However, Tsai fails to teach, disclose, or suggest a first via pad structure below a first metal pad structure, where the first metal pad structure comprises a plurality of segments of a first interconnect metal, where at least one of the plurality of segments of the first interconnect metal extends along at least one side of the first metal pad structure.

In Tsai, each sub-structure combination layer 42 includes dielectric layer 421, which further includes via openings formed through itself on first, second, and third areas of dielectric layer 421. See, for example, column 4, lines 41-45 and Figure 4A of Tsai. In Tsai, the via openings are filled with a metal material to form via plugs 423. See, for example, column 4, lines 66-67. However, in Tsai, via plugs 423 are separate via plugs that are not connected together in sub-structure combination layer 42. Furthermore, none of via plugs 423 are in contact with at least one of a plurality of segments of a first interconnect metal in a metal pad structure situated above sub-structure combination layer 42. Additionally, Tsai fails to teach, disclose, or suggest a via pad structure comprising a plurality of segments of a via metal and a plurality of segments of dielectric fillers, where

each of the plurality of segments of the dielectric fillers is situated between two of the plurality of segments of the via metal.

For all the foregoing reasons, Applicant respectfully submits that the present invention, as defined by amended independent claim 33, is not suggested, disclosed, or taught by Tsai. Thus, amended independent claim 33 is patentably distinguishable over Tsai and, as such, claims 34-44 depending from amended independent claim 33 are, *a fortiori*, also patentably distinguishable over Tsai for at least the reasons presented above and also for additional limitations contained in each dependent claim.

Independent claims 45, 51, and 69 have been amended in a manner similar to independent claim 33, and are thus allowable for reasons similar to those discussed above in relation to claim 33. For the foregoing reasons, Applicant respectfully submits that the present invention, as defined by amended independent claims 45, 51, and 69, is not suggested, disclosed, or taught by Tsai. As such, the present invention, as defined by amended independent claims 45, 51, and 69, is patentably distinguishable over Tsai. Thus, claims 46-50 depending from amended independent claim 45, claims 52-61 depending from amended independent claim 51, and claims 70-72 depending from amended independent claim 69 are, *a fortiori*, also patentably distinguishable over Liu for at least the reasons presented above and also for additional limitations contained in each dependent claim.

Based on the foregoing reasons, the present invention, as defined by amended independent claims 33, 45, 51, and 69 and claims depending therefrom, is patentably distinguishable over the art cited by the Examiner. Thus, claims 33-61 and 69-72 pending in the present application are patentably distinguishable over the art cited by the Examiner. As such, and for all the foregoing reasons, an early allowance of claims 33-61 and 69-72 pending in the present application is respectfully requested.

Respectfully Submitted,
FARJAMI & FARJAMI LLP



Michael Farjami, Esq.
Reg. No. 38, 135

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Michael Farjami, Esq.
FARJAMI & FARJAMI LLP
16148 Sand Canyon
Irvine, California 92618
Telephone: (949) 784-4600
Facsimile: (949) 784-4601

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